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California Environmental Protection Agency
California Regional Water Quality Control Board, Los
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GROUNDWATER MONITORING REPORT FOR
NATURAL ATTENUATION PARAMETERS
SLAUSON DISTRIBUTION CENTER
12500 E. SLAUSON AVENUE
SANTA FE SPRINGS, CALIFORNIA

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**GROUNDWATER MONITORING REPORT FOR
NATURAL ATTENUATION PARAMETERS
SLAUSON DISTRIBUTION CENTER
12500 E. SLAUSON AVENUE
SANTA FE SPRINGS, CALIFORNIA**

INTRODUCTION

This report describes activities related to collection/analyses of groundwater samples from three monitoring wells to assess natural attenuation parameters related to chlorinated solvents identified in shallow groundwater beneath the Property. Field work was completed in accordance with the July 2001 Groundwater Monitoring Workplan approved by the Los Angeles Regional Water Control Board (LARWQCB).

Previous monitoring of shallow groundwater at the Property has shown the presence of chlorinated solvents. Specifically, groundwater data collected in the late 1980's through 2000 has detected the following constituents:

- PCE (perchloroethylene)
- TCE (trichloroethylene)
- Chloroform
- cis-1,2 DCE (dichloroethylene)
- Freon 11
- 1,1 DCE (dichloroethylene)

In addition, low levels of diesel fuel-related constituents such as toluene, xylenes, isopropylbenzene, trimethylbenzenes, and isopropyltoluene are also present in groundwater. These constituents are related to former underground fuel tanks located on the property that were removed in the late 1980's. Regulatory closure for these underground tanks was issued by the LARWQCB in 1996.

Historically, the highest concentrations of volatile organic compounds (VOCs - mainly PCE) detected in groundwater have been in the range of 200 to 300 ug/l in the area south and southeast of the truck maintenance facility.

BACKGROUND

General

The Slauson Distribution Center facility is located at 12500 E. Slauson Avenue, Santa Fe Springs, California (Figure 1). The Property encompasses an area of approximately 12 acres that has been used mainly for warehouse/distribution of food items and sundries. A truck maintenance/wash facility has been located in the southwest portion of the property since the 1970's.

Site Characteristics and Regional Information

- VOCs present in groundwater show that natural attenuation is occurring due to



the fact that breakdown by-products such as TCE and cis 1,2 DCE are present.

- The first 25 feet of soil is predominantly a clay layer. If a significant source of VOCs were released on the property that impacted groundwater, residual VOCs would be present in the clay. To date, no VOCs detected in groundwater have been identified in soils or soil vapor samples analyzed from the Property.
- A former pump and treat system located on the Property extracted more than 10M gallons of water; contaminated groundwater from adjacent sites would have likely been pulled onto the Property.
- A review of the RWQCB SLIC database shows that more than 50 sites are located in the same zip code (90670) as the subject Property. Two sites in the surrounding area have confirmed VOCs (including PCE) in groundwater exceeding 10,000 ug/l. Therefore, significant regional contamination related to VOCs exist.
- An adjacent railroad spur operates along the southern and western margins of the property. It is possible that historical leaks and spills from tanker cars have contributed to groundwater contamination of this area of Santa Fe Springs. Contamination related to tanker cars has been identified at the former Angeles Chemical facility located 8516, Sorensen Avenue, approximately 0.25 miles west of the subject property.
- Dry cleaning operations are located north (upgradient) of the subject property in the city of Whittier.
- No significant solvent use on the property has been identified.

Objective

- Evaluate the potential for natural attenuation of halogenated volatile organic compounds (HVOCs) in groundwater beneath the Property.

GEOLOGIC, HYDROLOGIC, AND TOPOGRAPHIC INFORMATION

The site lies in the Central Groundwater Basin of the Los Angeles Coastal Plain. The uppermost aquifer underlying the subject site consists of sand and silty sand which lies below a depth of approximately 26 to 28 feet. Above this is a clay layer which extends downward from the surface.

Historical site information indicates that flow direction of groundwater beneath the Property is to the southwest.

INSTALLATION OF GROUNDWATER MONITORING WELLS

On August 16 and 17, 2001, three groundwater monitoring wells were installed on the Property. Figure 2 shows the approximate locations of the monitoring wells.



- Nitrate – EPA Method 352.1
- Ferrous iron – SM 3500-Fe-D
- Methane – EPA Method 8015M

Laboratory Analytical Data

Table 1 provides a summary of the analytical data (Appendix A) for samples collected from each groundwater monitoring well. As shown, each well contains a similar ratio (approximately 1:1) of concentrations of PCE and TCE which indicates that reductive dechlorination of PCE is occurring. In addition, the only form of 1,2 dichloroethene detected in each well was cis-1,2 DCE, which further supports bio-transformation of PCE into other chlorinated compounds.

Evidence Related to Natural Attenuation

Of paramount importance is determining whether natural attenuation is occurring in the groundwater. Based on the U.S. EPA Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water (1998) and other recent reports, more highly chlorinated VOCs are typically biodegraded under natural conditions via reductive dechlorination. Conditions which promote natural attenuation of these substances in an aquifer would include low concentrations of dissolved oxygen and other potentially oxidizing substances, low oxidation reduction potential, presence of organic carbon and/or hydrogen which can act as electron donors, pH between 6 and 8 (most conducive to biological activity), and temperature exceeding approximately 68 degrees F (low temperature would reduce the rate at which chemical reactions occurred).

Certain chemical parameters may indicate that natural attenuation has taken place. These include presence of breakdown products (such as ethane or methane), iron II which can result from the reduction of iron III during anaerobic degradation of organics, increased alkalinity resulting from increased microbial activity, and ORP decrease.

There is evidence to support that natural bio-transformation has taken place at the site. As mentioned above, the main VOC identified in the past has been PCE (with only trace levels of TCE). Current data shows biodegradation by-products such as TCE and cis-1,2 DCE. It is almost certain that PCE has been biodegraded to TCE and cis-1,2 DCE. Although 1,1-DCE was also detected, the parent compound 1,1,1-TCA has never been detected at significant concentrations in groundwater at the Slauson site.

ORP field readings averaged less than 100, which further supports that a reductive pathway is possible for chlorinated VOCs in groundwater. TPH as gasoline averaged approximately 180 mg/l, with well MW2 showing the highest concentration at 290 mg/l. TPH is a source of carbon and energy which is a driver for dechlorination.

Methane was detected in two of wells (MW1 and MW2), indicating that anaerobic activity is occurring in the saturated zone.

SCS evaluated the analytical data generated for the site using a natural attenuation screening protocol worksheet. The tabulated scoring of 13 suggests that there is evidence for reductive dechlorination of volatile organics in groundwater. The worksheet is provided in Appendix B.



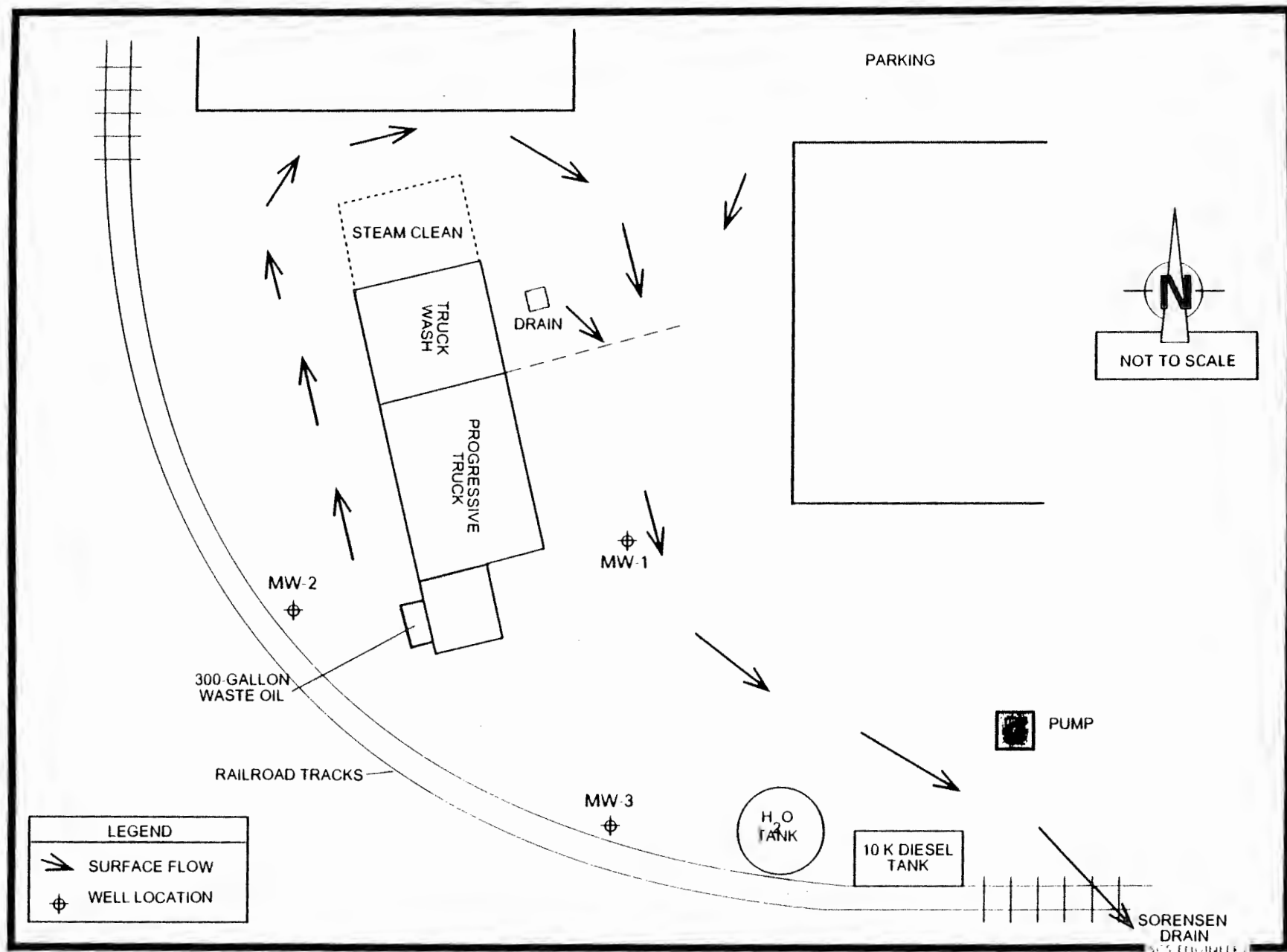


Figure 2. Sketch Map of Site Showing Locations of Monitoring Wells.



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ANALYTICAL RESULTS

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Site

Santa Fe Springs

Telephone: (562)426-9544

Attn: Tom Dang

Page: 2

Project ID: AMB DC

Project Name: AMB Dist Center

AETL Job Number	Submitted	Client
19730	09/04/2001	SCS

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch Number: 09052001 / 09052001

Our Lab I.D.			AE102934	AE102935	AE102936	
Client Sample I.D.			Method Blank	MW-1	MW-2	MW-3
Date Sampled			09/04/2001	09/04/2001	09/04/2001	09/04/2001
Date Prepared			09/05/2001	09/05/2001	09/05/2001	09/05/2001
Preparation Method			5035	5035	5035	5035
Date Analyzed			09/05/2001	09/05/2001	09/05/2001	09/05/2001
Matrix			Aqueous	Aqueous	Aqueous	Aqueous
Units			ug/L	ug/L	ug/L	ug/L
Dilution Factor			1	1	1	1
Analytes	MDL	PQL	Results	Results	Results	Results
Acetone	2.5	5.0	ND	ND	ND	ND
Benzene	0.5	1.0	ND	ND	1.8	ND
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND	ND	ND
Bromochloromethane	0.5	1.0	ND	ND	ND	ND
Bromodichloromethane	0.5	1.0	ND	ND	ND	ND
Bromoform (Tribromomethane)	2.5	5.0	ND	ND	ND	ND
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND	ND	ND
2-Butanone (MEK)	2.5	5.0	ND	ND	ND	ND
n-Butylbenzene	0.5	1.0	ND	ND	1.3	ND
sec-Butylbenzene	0.5	1.0	ND	ND	2.2	ND
tert-Butylbenzene	0.5	1.0	ND	ND	ND	ND
Carbon Disulfide	0.5	1.0	ND	ND	ND	ND
Carbon tetrachloride	0.5	1.0	ND	ND	ND	ND
Chlorobenzene	0.5	1.0	ND	ND	ND	ND
Chloroethane	1.5	3.0	ND	ND	ND	ND
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND	ND	ND
Chloroform (Trichloromethane)	0.5	1.0	ND	2.1	0.8J	0.9J
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND	ND	ND
2-Chlorotoluene	0.5	1.0	ND	ND	ND	ND
4-Chlorotoluene	0.5	1.0	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND	ND	ND
Dibromochloromethane	0.5	1.0	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND	ND	ND
Dibromomethane	0.5	1.0	ND	ND	ND	ND
1,2-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND
1,3-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND



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ANALYTICAL RESULTS

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Our Lab I.D.			AE102934		AE102935		AE102936			
Client Sample I.D.			Method Blank		MW-1		MW-2		MW-3	
Date Sampled			09/04/2001		09/04/2001		09/04/2001		09/04/2001	
Date Prepared			09/05/2001		09/05/2001		09/05/2001		09/05/2001	
Preparation Method			5035		5035		5035		5035	
Date Analyzed			09/05/2001		09/05/2001		09/05/2001		09/05/2001	
Matrix			Aqueous		Aqueous		Aqueous		Aqueous	
Units			ug/L		ug/L		ug/L		ug/L	
Dilution Factor			1		1		1		1	
Analytes			MDL	PQL	Results	Results	Results	Results	Results	Results
1,4-Dichlorobenzene			0.5	1.0	ND	ND	ND	ND		
Dichlorodifluoromethane			1.5	3.0	ND	ND	ND	ND		
1,1-Dichloroethane			0.5	1.0	ND	0.7J	ND	ND		
1,2-Dichloroethane (EDC)			0.5	1.0	ND	0.6J	ND	ND		
1,1-Dichloroethene			0.5	1.0	ND	194	46.3	62.1		
cis-1,2-Dichloroethene			0.5	1.0	ND	3.7	1.6	1.9		
trans-1,2-Dichloroethene			0.5	1.0	ND	ND	ND	ND		
1,2-Dichloropropane			0.5	1.0	ND	ND	ND	ND		
1,3-Dichloropropane			0.5	1.0	ND	ND	ND	ND		
2,2-Dichloropropane			0.5	1.0	ND	ND	ND	ND		
1,1-Dichloropropene			0.5	1.0	ND	ND	ND	ND		
cis-1,3-Dichloropropene			0.5	1.0	ND	ND	ND	ND		
trans-1,3-Dichloropropene			0.5	1.0	ND	ND	ND	ND		
Ethylbenzene			0.5	1.0	ND	ND	1.6	ND		
Hexachlorobutadiene			1.5	3.0	ND	ND	ND	ND		
2-Hexanone			2.5	5.0	ND	ND	ND	ND		
Isopropylbenzene			0.5	1.0	ND	ND	2.7	ND		
p-Isopropyltoluene			0.5	1.0	ND	ND	ND	ND		
4-Methyl-2-pentanone (MIBK)			2.5	5.0	ND	ND	ND	ND		
Methyl-tert-butyl ether (MTBE)			0.5	1.0	ND	2.1	0.6J	0.6J		
Methylene chloride (DCM)			2.0	4.0	ND	ND	ND	ND		
Naphthalene			0.5	1.0	ND	ND	53.9	ND		
n-Propylbenzene			0.5	1.0	ND	ND	2.7	ND		
Styrene			0.5	1.0	ND	ND	ND	ND		
1,1,1,2-Tetrachloroethane			0.5	1.0	ND	ND	ND	ND		
1,1,2,2-Tetrachloroethane			0.5	1.0	ND	ND	ND	ND		
Tetrachloroethene			0.5	1.0	ND	267	39.6	117		
Toluene (Methyl benzene)			0.5	1.0	ND	ND	ND	ND		
1,2,3-Trichlorobenzene			0.5	1.0	ND	ND	ND	ND		
1,2,4-Trichlorobenzene			0.5	1.0	ND	ND	ND	ND		
1,1,1-Trichloroethane			0.5	1.0	ND	1.0	ND	ND		
1,1,2-Trichloroethane			0.5	1.0	ND	ND	ND	ND		
Trichloroethene			0.5	1.0	ND	205	50.8	108		
Trichlorofluoromethane			0.5	1.0	ND	168	32.6	49.0		



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Project ID: AMB DC

Project Name: AMB Dist Center

Site

Santa Fe Springs

AETL Job Number	Submitted	Client
19730	09/04/2001	SCS

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QUALITY CONTROL REPORT

QC Batch Number: 09052001 / 09052001

Analytes	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	50.00	50.50	101	50.00	50.50	101	<1	75-125	<20
Chlorobenzene	50.00	52.50	105	50.00	52.50	105	<1	75-125	<20
1,1-Dichloroethene	50.00	51.00	102	50.00	51.00	102	<1	75-125	<20
Methyl-tert-butyl ether (MTBE)	50.00	48.50	97	50.00	48.00	96	1.0	75-125	<20
Toluene (Methyl benzene)	50.00	50.50	101	50.00	51.00	102	<1	75-125	<20
Trichloroethene	50.00	49.50	99	50.00	49.00	98	1.0	75-125	<20

QC Batch Number: 09052001 / 09052001

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit
Benzene	50.00	51.00	102	75-125
Chlorobenzene	50.00	52.00	104	75-125
1,1-Dichloroethene	50.00	51.00	102	75-125
Methyl-tert-butyl ether (MTBE)	50.00	51.00	102	75-125
Toluene (Methyl benzene)	50.00	50.00	100	75-125
Trichloroethene	50.00	49.50	99	75-125
LCS				
Chloroform (Trichloromethane)	50.00	49.50	99	75-125
Ethylbenzene	50.00	53.00	106	75-125
1,1,1-Trichloroethane	50.00	49.00	98	75-125
o-Xylene	50.00	52.50	105	75-125
m,p-Xylenes	50.00	53.00	106	75-125